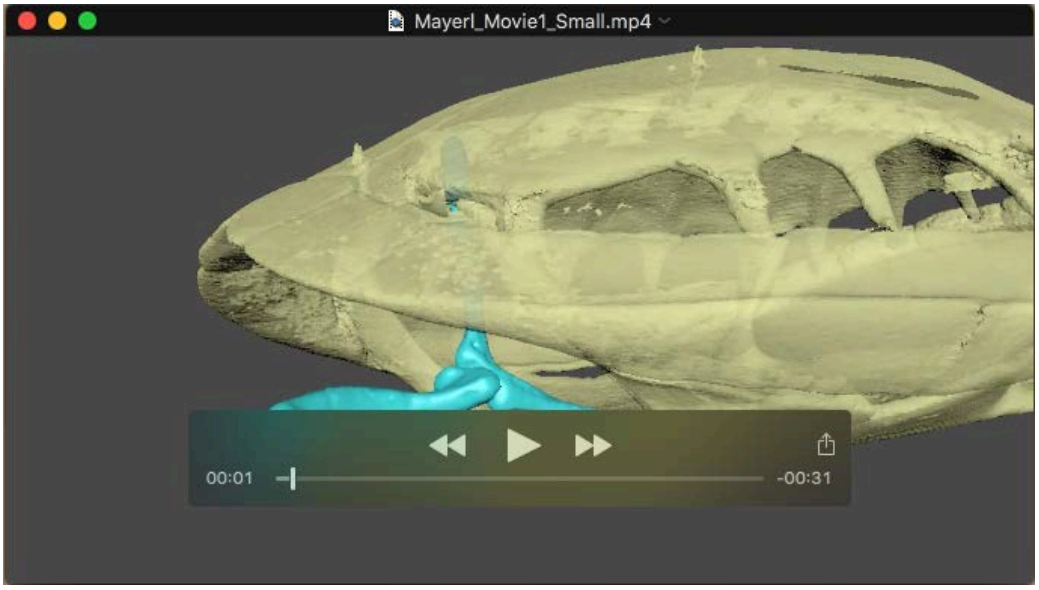

Movie 1. XROMM animation of the pectoral girdle and humerus of *Pseudemys concinna* walking from a lateral view (first three steps) and a dorsal view (last three steps).

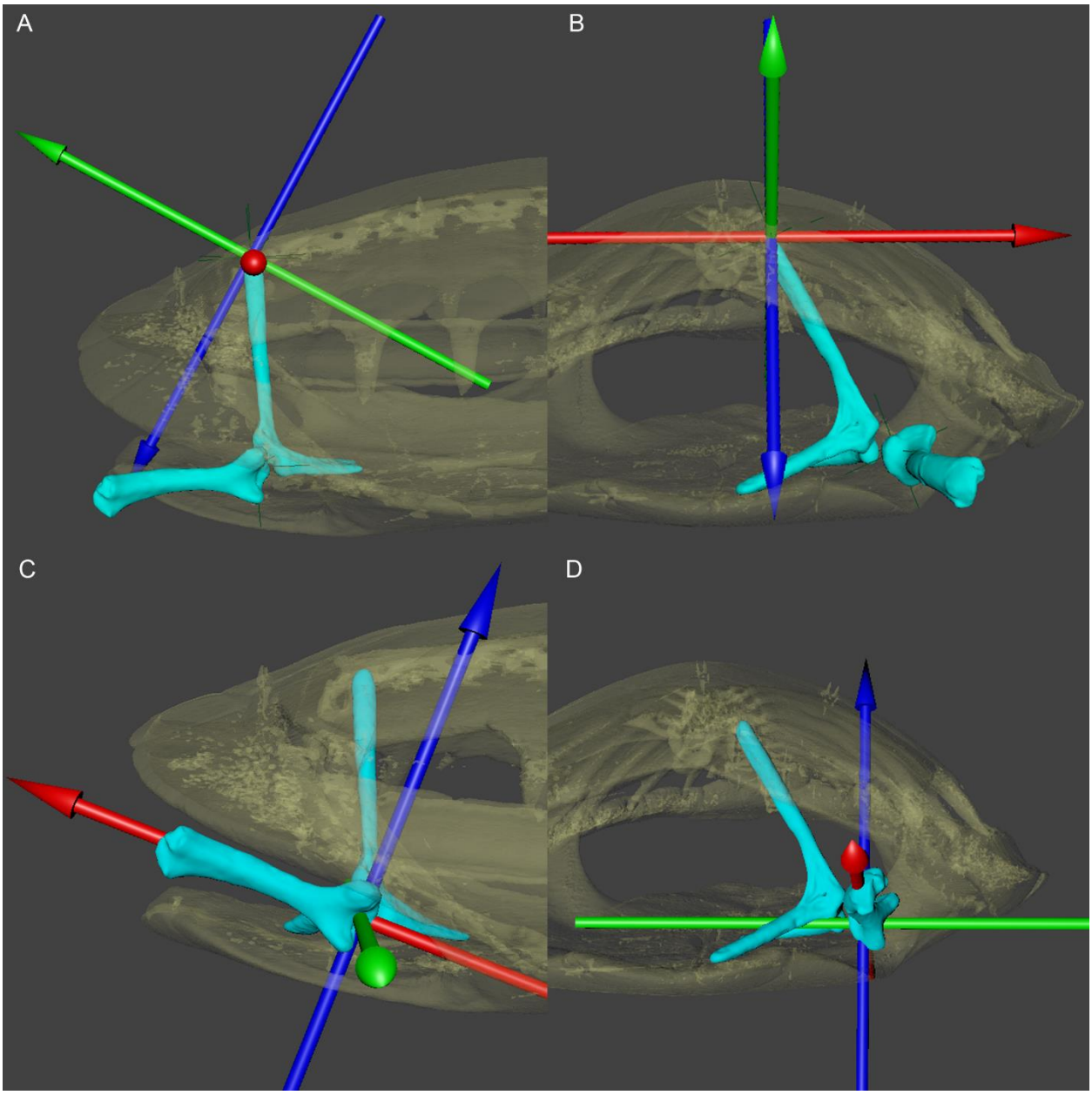

Figure S1. Joint coordinate system for the pectoral girdle (A,B) and humerus (C,D) in *Pseudemys concinna* in lateral (left) and anterior (right) views. Axis orientations for the pectoral girdle were set so that rotation about the x axis (red) measures pitch, rotation about the y-axis (green) measures roll, and rotation about the z-axis (blue) measures yaw. Movements of the pectoral girdle were measured relative to the shell. Axis orientations for the humerus were set so that rotation about the x axis (red) measures long-axis rotation, rotation about the y-axis (green) measures abduction/adduction, and rotation about the z-axis (blue) measures protraction/retraction. Movements of the humerus were measured relative to the pectoral girdle.

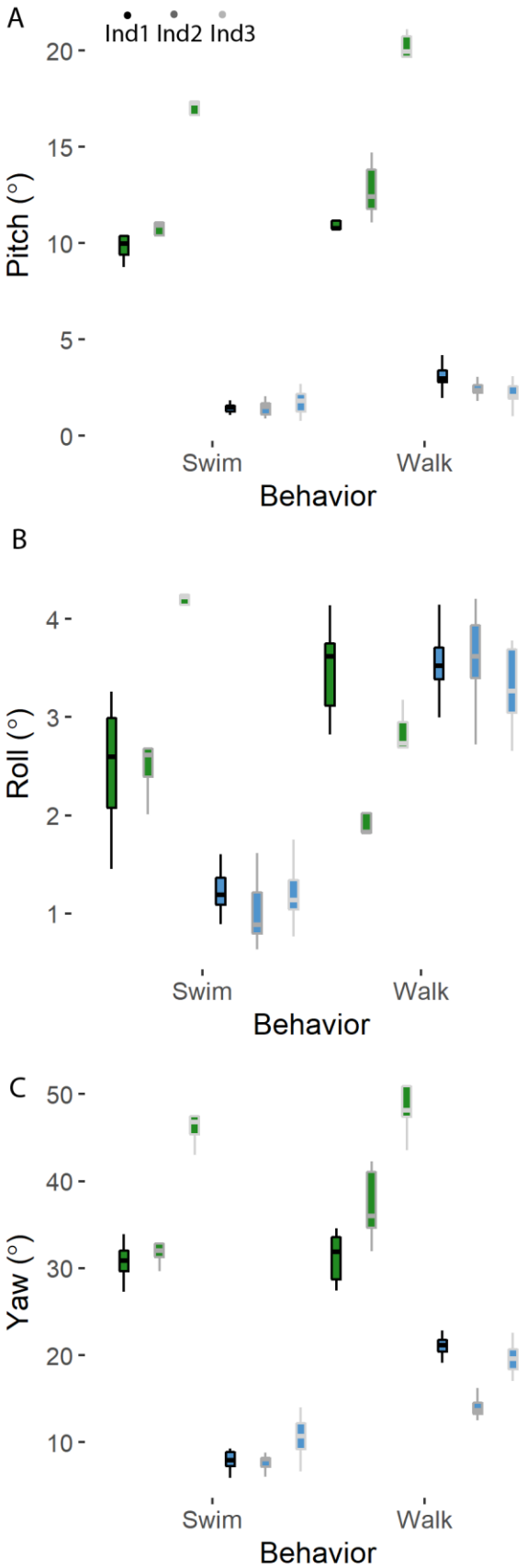

Figure S2. Girdle rotations for individual turtles during walking and swimming for pitch (A), roll (B) and yaw (C) movements. Green box and whisker plots indicate shoulder movements; blue box and whisker plots indicate pelvic girdle movements.

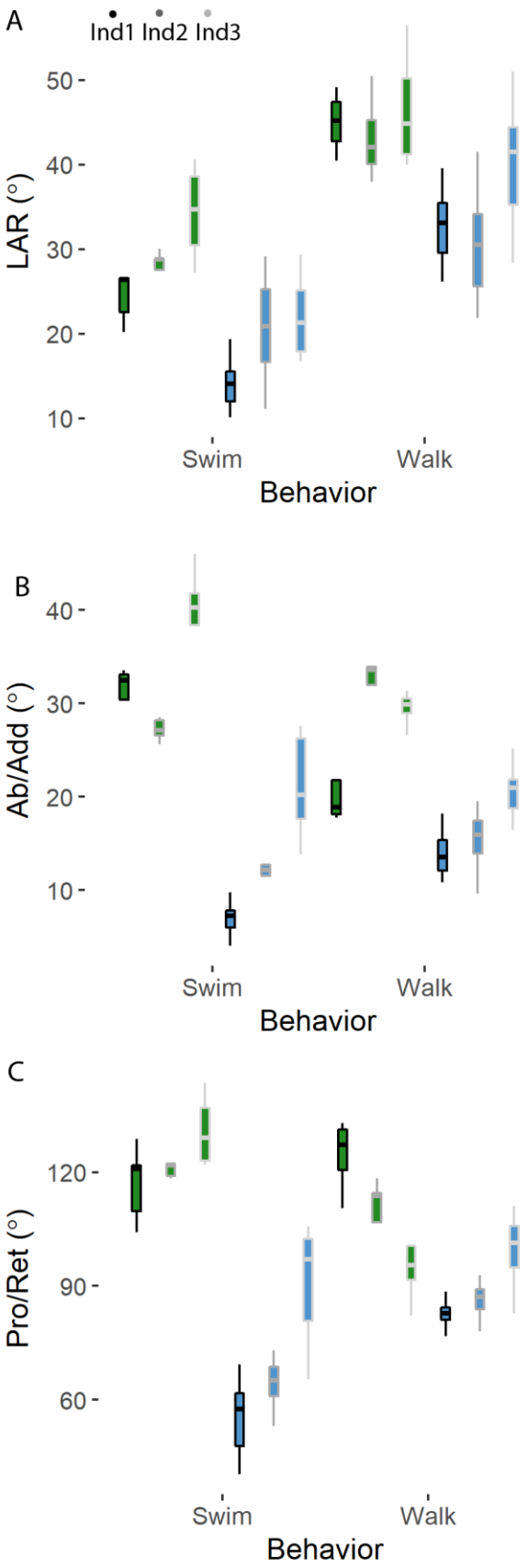

Figure S3. Limb rotations for individual turtles during walking and swimming for LAR (A) Abduction/ Adduction (B) and Protraction/Retraction (C). Green box and whisker plots indicate humeral movements; blue box and whisker plots indicate femoral movements.

Table S1. Tukey's post-hoc analyses for girdle movements in which the behavior * girdle interaction was significant (N = 107).

	Ry, 'roll' (value, p)	Rz, 'Yaw'
SS - PS	**1.98, <0.001**	**27.64, <0.001**
SW – PW	-0.34, 0.17	**18.02, <0.001**
SS – SW	0.41, 0.19	-2.64, 0.23
PS - PW	**-2.32, <0.001**	**-9.62, <0.001**

SS: Shoulder movements during swimming; PS: pelvis movements during swims; SW: shoulder movements during walking; PW: pelvis movements during walking

Bolded values indicate statistically significant differences between groups.

Table S2. Mean +/- SE Rotational excursion of the humerus and femur during swimming and walking.

	Humerus		Femur		Ω^2	p-value		
	Swim (N = 14)	Walk (N = 14)	Swim (N = 30)	Walk (N = 50)		Limb	Behavior	Limb * behavior
Rx, 'LAR'	29.9 ± 2.7	44.7 ± 2.7	18.4 ± 2.4	34.3 ± 2.4	**0.74**	**<0.001**	**<0.001**	0.67
Ry, 'Ab/add'	32.6 ± 2.9	27.8 ± 2.9	13.2 ± 2.8	16.5 ± 2.8	**0.82**	NA	NA	**<0.001**
Rz, 'Pro/ret'	123.6 ± 2.9	108.3 ± 5.9	70.4 ± 5.5	89.6 ± 5.3	**0.73**	NA	NA	**<0.001**

Ω^2: Measure of effects size of the model (Variable ~ Limb + Behavior + Limb*Behavior + (1|Turtle))

Bolded values indicate statistically significant differences between groups.

Table S3. Tukey's post hoc results on limb rotations for limb movements in which the behavior * limb interaction was significant (N = 103).

	Ry, Add/ab	Rz, Pro/ret
HS-FS	**19.41, <0.001**	**53.21, <0.001**
HW-FW	**11.30, <0.001**	**18.70, <0.001**
HS-HW	**4.82, 0.006**	**15.32, 0.004**
FS-FW	**-3.30, 0.001**	**-19.20, <0.001**

HS: Humeral rotations during swimming; HW: humeral rotations during walking; FS: femoral movements during swimming; FW: femoral movements during walking

Bolded values indicate statistically significant differences between groups.